**PUBLIC UTILITIES COMMISSION OF THE STATE OF CALIFORNIA**

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| Safety and Enforcement Division<br>Rail Transit and Crossings Branch<br>Rail Transit Safety Section | Resolution ST-157<br>December 5, 2013 |

# R E S O L U T I O N

RESOLUTION ST-157 GRANTING APPROVAL OF THE SAN FRANCISCO MUNICIPAL TRANSPORTATION AGENCY'S SAFETY AND SECURITY CERTIFICATION PLAN FOR THE AUTOMATIC TRAIN CONTROL SYSTEM SYSTEM MANAGEMENT CONSOLE PLATFORM UPGRADE PROJECT

## SUMMARY

This Resolution grants San Francisco Municipal Transportation Agency's request for approval of the Automatic Train Control System System Management Console Platform Upgrade Project Safety and Security Certification Plan, dated September 27, 2013.

## PROJECT DESCRIPTION

The Automatic Train Control System (ATCS) manages light rail vehicle movements through the San Francisco Municipal Transportation Agency's (SFMTA) Muni Metro subway infrastructure. ATCS consists of train control subsystems working together including:

- a vital vehicle on-board subsystem,
- a vital wayside subsystem (SCS),
- a vital train control subsystem(VCC), and
- a non-vital system management console subsystem (SMC).

The SMC subsystem consists of several networked workstations and servers which are linked to the VCC subsystem. The VCC controls automatic train movements through the subway. The SMC workstations provide a user-friendly

graphical user interface to the train controller for the high-level management of vehicle movements through the subway at the current SFMTA Metro operations control center (OCC). The SMC workstations display real-time train status, train location, and alarms, and allow train controllers to route trains through the subway.

The current SMC's applications use an obsolete operating system computer hardware and software. This obsolescence prevents implementation of updates to make changes to existing features as the SFMTA rail infrastructure changes, or to take advantage of technology improvements. The SMC upgrade project is upgrading the hardware, operating system, and graphical user interface for both the revenue and training SMC to a modern, state of the art configuration. A new revenue SMC rack and a new training SMC rack will be installed in current SFMTA Metro OCC computer room. New revenue workstations will be installed on the main OCC control room floor and new training workstations will be installed in the OCC training room.

The ATCS upgrade project is being implemented in two phases:

- Revenue 1 - Upgrade the ATCS operating system, initially installed in the mid-1990's, from Microsoft OS-2 to Windows 7. Implement "Advanced Destination on the Fly" to support Double Stopping functionality.
- Revenue 2 – Implement two new features to the ATCS system:
    - Central and Local Fallback

These functional changes are described below.

Phase 1:

ATCS Operating System Upgrade and Advanced Destination on the Fly Function - The primary purpose of the ATCS upgrade project is to upgrade the operating system, initially installed in the mid-1990's, from Microsoft OS-2 to Windows 7. The software of the VCC (vital) is being modified to allow a train to change its station stop point after it has left a previous station platform. This way a train can be re-routed "on the fly" to the front berth if it becomes available after it left the previous station. This feature is required for the platform Double Stopping functionality. Double Stopping is a modification of an existing feature of the OS/2 system, currently unused, that allows two trains to stop simultaneously at

Civic Center, Montgomery, and Powell stations. Advanced Destination on the Fly speeds up the Double Stopping handling such that a train which has been routed to the rear berth of a Double Stopping platform can be re-routed from the rear berth to the front berth of its destination platform without having it stop at the rear berth first. This upgrade will also eliminate operations and maintenance issues associated with operating obsolete systems (e.g. spare parts issues).

Phase 2:

Central and Local Fallback Function – In this phase, SFMTA will remove the legacy relay-based fixed-block train control system. The centralized train control (CTC) system is currently used to control train movements in the subway via the relay based train control system if there is a failure of the ATCS system. The local interlocking control panels are used by maintenance to provide local control of interlockings from signal rooms. The CTC and local control panels will be removed by the final cutover project. Similar functionality will be introduced by the SMC project to replace functionality lost once final cutover is complete. Computer workstations called "local SMCs" (LSMCs) will be installed in signal rooms which will allow local control of switches by maintenance personnel. These workstations will interface with the existing ATCS station controller equipment in the signal room via an RS-232 cable. The vital firmware of the station controller will be updated to accommodate an additional serial port. These signal room workstations will replace the removed local interlocking control panels. The workstations will be housed in new equipment racks installed in the signal rooms near the SCS rack. A feature called "central fallback" will be introduced which will allow monitoring and management of manual train movements through the subway from SMC workstations at the current SFMTA Muni Metro OCC in the event of a failure of the ATCS vital train control VCC subsystem. This feature will replace the CTC system. Communication between the LSMCs and the OCC will occur via the secure systems data network.

The ATCS Upgrade Safety and Security Certification Plan (SSCP) describes the processes, responsibilities, documentation, and procedures for certification. Additionally, it provides a framework for ensuring that appropriate safety and security related activities are performed and documented to support each Certificate of Conformance (COC) issued. The plan is periodically reviewed and revised as needed during the project.

## BACKGROUND

Commission General Order 164-D, *Rules and Regulations Governing State Safety Oversight of Rail Fixed Guideway Systems*, Section 11, *Requirements for Safety Certification Plan,* requires that each Rail Transit Agency (RTA) prepare a project specific SSCP for each major project and ensure that all entities involved in design, construction, operation, and maintenance of the project comply with the safety certification process.

The SSCP ensures that elements critical to the safety and security are planned, designed, constructed, analyzed, tested, inspected, and implemented. The SSCP also ensures that training is provided and rules and procedures are followed. A written Safety Certification Verification Report (SCVR) is required by CPUC General Order 164-D at the end of the project. The SCVR shall be submitted to CPUC staff (staff) at least 21 calendar days prior to the start of revenue service of the project. The SCVR is then reviewed by CPUC staff and an approval letter is sent to the transit agency if the SCVR is acceptable.

On October 11, 2013, SFMTA submitted its plan titled "ATCS SMC Platform Upgrade Safety and Security Certification Plan" to staff for review and requested Commission approval.

Staff reviewed and analyzed the SFMTA SSCP and found that it meets SSCP requirements set forth in General Order 164-D and Rail Transit Safety Section Program Management Standard Procedures Manual, State Safety and Security Oversight of Rail Fixed Guideway System, Section 9.

## DISCUSSION

SFMTA is responsible for self-certifying the safety and security of the ATCS Upgrade design, installation, testing, contractor training, contractor operations and maintenance manuals for the ATCS Upgrade, rules and procedures, and operations training.

As described above, the ATCS Upgrade project is being implemented in two phases (Revenue 1 and Revenue 2). As a result of these two project phases, the safety and security certification program will also consist of two project certification phases, one for each project phase. Therefore, SFMTA will prepare

and submit separate Safety and Security Certification Verification Reports (SSCVR) for each phase to CPUC staff for review and approval prior to commencement of revenue service of each phase. These SSCVRs document the safety and security program associated with each phase.

The ATCS Upgrade certification contains six "Certifiable Factors":

**Certifiable Factors:**

a. Design Specification Conformance Criteria (Contract No. 1226 – Purchase Order (P.O.) No. 3) (i.e., conformance with safety requirements contained in P.O. No. 3)
b. Integration Testing Conformance
c. Hazard and Vulnerability Identification and Resolution Conformance
d. Operations and Maintenance Manuals Conformance
e. Rules and Procedures Conformance
f. Training Conformance

Some or all of the six Certifiable Factors apply to the single "Certifiable Element" which is the ATCS Upgrade Project defined in Contract No. 1226 – Purchase Order No. 3.

The issuance of a Certificate of Conformance requires the performance of various system safety and security activities. The activities may be performed either independently, or integrated with other tasks such as acceptance testing or quality control measures. Regardless of whether the activities are performed independently or integrated with others, adequate system safety and security activity records must be developed and maintained as evidentiary support for the Certificates of Conformance.

The SSCP will be updated as required. Changes may be proposed by any department and submitted in writing to the Director of System Safety for review and consideration. The Safety and Security Certification Review Committee will review and approve each revised SSCP. Each revised SSCP is submitted to the CPUC staff for approval in accordance with General Order 164-D requirements.

The SSCP is filed as required by General Order 164-D. SFMTA worked with CPUC staff to ensure the SSCP is comprehensive. Staff reviewed the SSCP in

accordance with General Order 164-D Section 11, *Requirements for Safety Certification Plan*. The SSCP is in compliance with General Order 164-D and staff recommends that the Commission grants approval of the SSCP. Staff will review and approve updates and revisions to the SSCP as the project progresses.

## NOTICE

On November 5, 2013, 2013, this Resolution was published on the Commission's Daily Calendar.

## COMMENTS

The draft resolution of the Safety and Enforcement Division in this matter was mailed in accordance with Section 311 of the Public Utilities Code and Rule 14.2(c) of the Commission's Rules of Practice and Procedure. No comments were received.

## FINDINGS

1. The ATCS upgrade project is being implemented by SFMTA to accomplish three major goals:
   - Upgrade the ATCS System Management Console, initially installed in the mid-1990's, from Microsoft OS-2 to Windows 7 operating system
   - Implement an Advanced Destination on the Fly function
   - Implement a Central Fallback and Local Fallback function into the ATCS
2. On October 11, 2013, SFMTA submitted the SSCP for its ATCS SMC Platform Upgrade project to staff for review and requested Commission approval.
3. Staff reviewed the SSCP and found that it meets the requirements set forth by General Order 164-D Section 11 and Program Management Standard Procedures Manual State Safety and Security Oversight of Rail Fixed Guideway System Section 9.
4. The SFMTA ATCS SMC Platform Upgrade project's SSCP will be updated and revised as necessary, as the project progresses, upon staff's approval.

**THEREFORE, IT IS ORDERED THAT:**

1. The San Francisco Municipal Transportation Agency's request for approval of the Safety and Security Certification Plan for its Automatic Train Control System System Management Console Platform Upgrade project is granted.

2. The San Francisco Municipal Transportation Agency shall file revisions of the Safety and Security Certification Plan with CPUC staff for review and approval.

3. The San Francisco Municipal Transportation Agency shall submit a Safety and Security Certification Verification Report for each phase of the project to CPUC staff as required by the Commission General Order 164-D, Section 12, at least 21 calendar days prior to the start of revenue service of each phase.

4. This Resolution is effective today.

I certify that the foregoing resolution was duly introduced, passed, and adopted at a conference of the Public Utilities Commission of the State of California held on December 5, 2013. The following Commissioners voting favorably thereon:

PAUL CLANON
Executive Director